

Application S.N. 10/630,065

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Reply to Office Action dated December 27, 2005

BEST AVAILABLE COPY**REMARKS**

In the Office Action dated December 27, 2005, the Examiner rejected claims 15-22, 35-42 and 44 under 35 U.S.C. § 103(a). The Examiner allows claims 1-3, 5-14, 23-25, 27-34 and 43. With this Amendment, no claims are added or cancelled. Claim 46 is amended. After entry of this amendment, claims 1-3, 5-25 and 27-46 are pending the application. Reconsideration of the Examiner's rejection is respectfully requested.

The Examiner rejects claims 15-22, 35-42 and 44 under 35 U.S.C. § 103(a) as being unpatentable over Hoffmann et al. (US 6,236,190) in view of Ward et al. (US 4,558,391). The Examiner states that Hoffmann et al. teaches a device and method incorporating all of the features of independent claims 15 and 35 except for a switch circuit for discharging the actuator in response to the removal of the connection to the power source. The Examiner further states that Ward et al. discloses a capacitive discharge drive comprising a switch (129) for actively discharging a capacitor (actuator) in response to removal of the connection to the power source for the purpose of automatically discharging any remaining energy in the capacitor (actuator) at any time upon removal of the primary power source. She concludes that it would have been obvious at the time the invention was made to use the switch circuit disclosed by Ward et al. in the invention disclosed by Hoffmann et al. for the purpose of automatically discharging the energy stored in the capacitor.

This rejection is traversed. It is respectfully submitted that the Examiner has resorted to impermissible hindsight in an attempt to render the claimed invention obvious. Obviousness requires the motivation for a combination to come from the art, not Applicant's own disclosure. Hoffmann et al is directed to a controlling a fuel injection valve with a capacitive actuator and a microprocessor-controlled control circuit ST. With the control signals on (st=1), when the actuator reaches a desired displacement ds and the fuel injection valve opens sufficiently the amount of fuel injected is proportional to the open time of the actuator due to constant fuel pressure. The fuel injection valve remains opened with the displacement ds until the control signal st ceases, st=0 (state V). As mentioned in response to the last Office Action, the Hoffmann et al. reference achieves discharge by a positive signal applied to T2 by control circuit ST in response to the absence of

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signal st ($st=0$, see column 4, lines 44-48, and states V and VI in Figure 3). More specifically, if the control signal becomes $st=0$, the switch T2 is turned on by the control circuit ST (state VI), as a result of which the piezo actuator is discharged via the resistor R and the fuel injection valve closes. Discharge is thus achieved within the context of control circuit ST functioning at all times with the power source. Hoffmann et al. does not teach or suggest removal of the connection to the power source, and such removal would not cause discharge of the actuator.

The Examiner attempts to cure this deficiency by reference to Ward et al., which is directed to using a capacitor to electrically drive a solenoid (inductive) actuator for an electric stapler. The Examiner states that Ward et al. discloses a capacitive discharge drive comprising a switch (129) for actively discharging a capacitor (which is characterized by the Examiner as an actuator) in response to removal of the connection to the power source for the purpose of automatically discharging any remaining energy in the capacitor at any time upon removal of the primary power source. First, Ward et al. does not teach or suggest the feature of active discharge of a smart material actuator. The capacitor of Ward et al. is not an actuator. Instead, Ward et al. teaches a solenoid actuator, which receives stored energy from a controlled discharge of the capacitor.

Furthermore, even if Ward et al. did teach or suggest active discharge of a smart material actuator under the conditions described in Applicant's claims, the Examiner's purported motivation is no motivation at all. Essentially, the Examiner is arguing that Ward et al. is teaching the ability to actively discharge a capacitor so that one can actively discharge a capacitor and that Hoffmann et al. would also include the ability to actively discharge a smart material actuator so that they could discharge a smart material actuator. To the contrary, Ward et al. teaches an auxiliary circuit 132, 134, 150, 136 that is designed to dump the capacitor charge in the event that the capacitor voltage exceeds a predetermined maximum desirable level by comparing the capacitor voltage to a reference voltage. (Col. 9, ll. 46-53). By chance, other functions may be provided, such as discharging any remaining capacitor energy when, for example, switch 129 is opened, shutting off power to the stapler. (Col. 9, ll. 53-60). This is a desirable side effect in Ward et al., which is a consumer product that can be turned on and off by a user and is connected to a line source that can see

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voltage fluctuations while attempting to produce a plurality of charging levels. Hoffmann et al., which incorporates a smart material actuator into a fuel injection valve of a combustion engine, does not have the same problems as Ward et al. and thus has no motivation to include circuitry that would dump the capacitor charge in the event that the capacitor voltage exceeds a predetermined maximum desirable level. Unless such motivation to make a combination exists in the prior art, the Examiner has failed to make a *prima facie* of obviousness. Claims 15-22 and 35-42 are thus allowable over the prior art of record.

In addition to the foregoing, it is respectfully submitted that the Examiner has failed to make a *prima facie* case of obviousness with respect to claims 19-22 and 39-42. As the Examiner states, Hoffmann et al. does disclose a voltage comparator. However, each of these claims requires the voltage comparator and a FBT transistor to control a DC to DC converter. Neither reference teaches or suggests this feature so the combination cannot.

Also, it is respectfully submitted that the Examiner has failed to make a *prima facie* case of obviousness with respect to claim 44. The Examiner allows claim 23, and claim 44 depends from claim 23. Therefore, claim 44 is also allowable.

With the Second Amendment previously submitted, Applicant submitted new dependent claims 45 and 46. The Examiner did not address these claims in the Office Action. Applicant has amended claim 46 herein to correct typographical errors. Applicant respectfully submits that these claims are allowable over the prior art of record based upon their dependence from allowable claims and based upon the unique features cited therein. Specifically, the proposed combination by the Examiner fails to teach or suggest the feature of claim 46 wherein the switch circuit for actively discharging further includes a controllable electrical connection switchable between an open state and a closed state in order to ground the smart material actuator, thereby causing active discharge of capacitive load in response to removal of the power source connection to the smart material actuator, and the feature of claim 46 wherein the step of actively discharging further includes the step of switching a controllable electrical connection between an open state and a closed state in order to ground the smart material actuator, thereby causing active discharge

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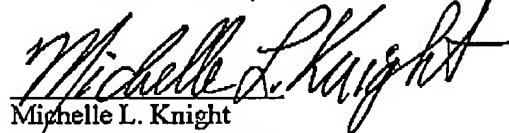
of capacitive load in response to removal of the power source connection to the smart material actuator.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,

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